WHAT IS CLAIMED IS:

1. An optical device comprising

a primary grating;

a light source disposed opposing a predetermined side of the primary grating;

a first reference grating disposed between the light source and the primary grating;

a photodetector disposed opposing the predetermined side of the primary grating; and

a second reference grating disposed between the photodetector and the primary grating;

wherein the primary grating, the first reference grating and the light source are configured for movement relative to one another.

2. The optical device of claim 1, wherein the primary grating is a moving grating and the first reference grating and second reference grating are fixed gratings.

3. The optical device of claim 1, wherein the primary grating, light source, first reference grating, second reference grating and photodetector are configured as an optical position encoder device.

4. The optical device of claim 1, wherein the grating is a reflective grating.

5. The optical device of claim 1, wherein the first reference grating and second reference grating are configured for identical relative motion with respect to the primary grating.

6. The optical device of claim 1, wherein the light source is a semiconductor laser.

7. The optical device of claim 1, wherein the light source is an extended light source.

8. The optical device of claim 7, wherein the extended light source is a light emitting diode (LED).

9. The optical device of claim 1, wherein a period Tr of the first reference grating and a period T of the second reference grating are related to a period T_s of the primary grating by the following formula: $\frac{1}{T}+\frac{1}{T_r}=\frac{1}{T_s}$.

10. An optical position encoder device comprising:

a moving grating with a period T_s;

a photodetector with light sensitive components;

a light source disposed on the photodetector;

a first fixed grating with spatial period T_r disposed on the light source; and

at least one second fixed grating with period T disposed on the light sensitive components;

wherein the moving grating is moveable relative to the first fixed grating and the light source.

11. The optical position encoder device of claim 9, wherein the light source is an incoherent light source.

12. The optical position encoder device of claim 9, wherein $\frac{1}{T}+\frac{1}{T_r}=\frac{1}{T_s}$.

13. The optical position encoder device of claim 10, wherein there is a plurality of second fixed gratings with a fixed phase relationship thereamong such that the photodetector receives only one harmonic component.

14. The optical position encoder device of claim 13, wherein the plurality of second fixed gratings are sinusoidal fixed gratings.

15. An optical device comprising

a primary grating;

a light source disposed opposing a predetermined side of the primary grating;

a first reference grating disposed between the light source and the primary grating;

a photodetector disposed on a far side of the primary grating; and

a second reference grating disposed between the photodetector and the primary grating;

wherein the primary grating, the first reference grating and the light source are configured for movement relative to one another.